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10/627,705	07/28/2003	Ju-Hee Cho	030681-540	3166
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BUCHANAN, INGERSOLL & ROONEY PC POST OFFICE BOX 1404 ALEXANDRIA, VA 22313-1404			ALEJANDRO, RAYMOND	
			ART UNIT	PAPER NUMBER
			1745	

DATE MAILED: 08/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/627,705

Applicant(s)

CHO ET AL.

Examiner

Raymond Alejandro

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07/14/06 & 05/05/06.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-19 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-19 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 28 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Response to Amendment***

This office document is offered in reply to applicant's amendment dated 05/05/06 and applicant's reply to restriction requirement dated 07/14/06. Applicant has overcome the objections and the 35 USC 103 rejection as set forth in the office action dated 02/13/06. Additionally, applicant fully responded to the restriction requirement of 06/22/06. Refer to the abovementioned amendment and/or reply for specific details on applicant's rebuttal arguments, remarks and/or election. However, the presently active claims (including newly added claims 11-19) are non-finally rejected over newly discovered art as discussed hereunder and for the reasons of record:

### ***Election/Restrictions***

1. Applicant's election with traverse of Group I in the reply filed on 07/14/06 is acknowledged.
2. Invention of Group III, claim 20, has been cancelled without prejudice or disclaimer.
3. Upon further consideration, the restriction requirement between Groups I and II is withdrawn. Thus, Groups I and II have been rejoined for purpose of examination. Therefore, response to applicant's traversal is unnecessary.

### ***Priority***

4. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file. ***Information Disclosure Statement***

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5. The information disclosure statements (IDS) submitted on 12/20/04 and 07/28/03 were considered by the examiner.

***Drawings***

6. The drawings were received on 07/28/03. These drawings are acceptable.

***Claim Rejections - 35 USC § 112***

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

9. Claim 15 is indefinite because it recites a broader Formula 1 while claim 13 (from which claim 15 depends) recites a narrower embodiment of Formula 1. For instance, claim 13 recites the sulfonate group (SO<sub>3</sub>X) is a “propane sulfonate group” whereas claim 15 recites that Formula 1 is represented by - R<sub>1</sub>-SO<sub>3</sub>X where R<sub>1</sub> is an alkylene group with 2-7 carbon atoms. Thus, dependent claim 15 does not further limit independent claim 13.

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

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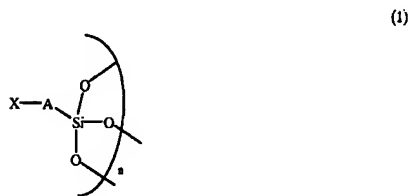
such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 1, 4-6, 9-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakano et al 2002/0061432 in view of the Japanese publication 10-069817 (heretofore 'the JP'817').

Concerning claim 1, 6 and 13-16:

Nakano et al disclose a proton conductive film for an electrolytic membrane for a fuel cell, the proton conductive film being a composite body comprising a proton conductive polymer and a compound represented by the general formula (1) (ABSTRACT):



wherein A represents a substituted or un-substituted divalent organic group (ABSTRACT); and X represents another functional group (ABSTRACT). The atomic group A represents a divalent organic group such as ethylene group, or trimethylene group or phenylene group (P. 0029).

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Disclosed is the proton conductive solid polymer such as a perfluorosulfonic acid available under the tradename of NAFION (P. 0007/ EXAMPLE 1-2, 11, 12).

The fuel cell includes the electrolyte, the cathode and the anode as well (P. 0072).

With respect to claim 4-5, 9-10 and 17-18:

Disclosed is the proton conductive solid polymer such as a perfluorosulfonic acid available under the tradename of NAFION (P. 0007/ EXAMPLE 1-2, 11, 12). Nakano et al also disclose the following (P. 0026):

[0026] In the proton conductive film according to one embodiment of the present invention, it is possible for the proton conductive polymer to be provided by, for example, a polystyrene-sulfonic acid copolymer, a polyvinyl-sulfonic acid copolymer, a crosslinked alkyl sulfonic acid derivative, a fluorine-containing polymer having a fluorine-containing resin skeleton and a sulfonic group, and a fluorine-containing polymer having a fluorine-containing resin skeleton and a carboxylic group. Particularly, it is most desirable for the proton conductive polymer to be provided by a polymer having at least one of a sulfonic group and a carboxylic group and a fluorine-containing resin skeleton in view of the durability, the film strength and the ionic conductivity.

Nakano et al also disclose the use of a sulfonamide group (P. 0028).

*Note: it noted that Nafion is a perfluorosulfonic acid polymer membrane exhibiting the specific claimed fluorine amount-percent.*

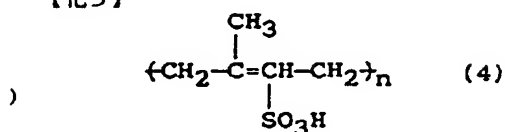
Nakano et al disclose a fuel cell and polymer composite membrane as seen and described above. However, Nakano et al does not expressly disclose the silicon-based material having the specific silicon-hydrogen bond; and the specific sulfonate-disulfide groups (as recited in claims 11-16).

The JP'817 describes a proton conductor and an electrochemical element using the same formed with a compound mainly containing silicon oxide, Bronsted acid and copolymer having sulfonic acid side chains; it also includes a phosphoric acid group (ABSTRACT).

Specifically, the JP'817 reveals the following structural formula (P0013):

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【化3】



In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the art at the time the invention was made to use the specific the silicon-based material having the specific silicon-hydrogen bond of the JP'817 in the polymer composite membrane and fuel cell of Nakano et al because the JP'817 discloses that it provides a proton conductor with excellent proton conductivity and machine-ability without causing the decrease of the proton conductivity under a dry atmosphere.

With respect to the specific sulfonate-disulfide groups (as recited in claims 11-16), when chemical compounds have very close structural similarities and similar utilities a prima-facie case may be made. Thus, evidence of similar properties or evidence of any useful properties disclosed in the prior art that would be expected to be shared by the claimed invention weighs in favor of a conclusion that the claimed invention would have been obvious. *Dillon, 919 F.2d at 697-98, 16 USPQ2d at 1905; In re Wilder, 563 F.2d 457, 461, 195 USPQ 426, 430 (CCPA 1977); In re Linter, 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CCPA 1972)*. Indeed, when similar compounds behave similarly in certain chemical reactions, it has been held that one of ordinary skill in the relevant art would have been motivated to select either structure. In fact, similar properties may normally be presumed when compounds are very close in nature. *919 F.2d at 692, 16 USPQ2d at 1900-01. Dillon, 919 F.2d at 693, 696, 16 USPQ2d at 1901, 1904. See also In re Grabiak, 769 F.2d 729, 731, 226 USPQ 870, 871 (Fed. Cir. 1985)*. It is the properties and utilities that provide real world motivation for a person of ordinary skill to make

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species structurally similar to those in the prior art. *Dillon*, 919 F.2d at 697, 16 USPQ2d at 1905; *In re Stemniski*, 444 F.2d 581, 586, 170 USPQ 343, 348 (CCPA 1971). Other structural similarities have been found to support a prima facie case of obviousness. *See, e.g., In re May*, 574 F.2d 1082, 1093-95, 197 USPQ 601, 610-11 (CCPA 1978) (stereoisomers); *In re Wilder*, 563 F.2d 457, 460, 195 USPQ 426, 429 (CCPA 1977) (adjacent homologs and structural isomers); *In re Hoch*, 428 F.2d 1341, 1344, 166 USPQ 406, 409 (CCPA 1970) (acid and ethyl ester); *In re Druey*, 319 F.2d 237, 240, 138 USPQ 39, 41 (CCPA 1963) (omission of methyl group from pyrazole ring). The closer the physical and chemical similarities between the claimed species or subgenus and any exemplary species or subgenus disclosed in the prior art, the greater the expectation that the claimed subject matter will function in an equivalent manner to the genus. *See, e.g., Dillon*, 919 F.2d at 696, 16 USPQ2d at 1904 (and cases cited therein). If such a species or subgenus is structurally similar to that claimed, its disclosure may motivate one of ordinary skill in the art to choose the claimed species or subgenus from the genus, based on the reasonable expectation that structurally similar species usually have similar properties. *See, e.g., Dillon*, 919 F.2d at 693, 696, 16 USPQ2d at 1901, 1904. *See also Deuel*, 51 F.3d at 1558, 34 USPQ2d at 1214 Structural relationships may provide the requisite motivation or suggestion to modify known compounds to obtain new compounds. The utility of such properties will normally provide some motivation to make the claimed species or subgenus. ***See MPEP 2144.08 Obviousness of Species When Prior Art Teaches Genus.***

*Applicable Examples to demonstrate that additional species are prima facie obvious over a genus or similar structural/chemical compounds:* Concepts used to analyze the structural similarity of chemical compounds in other types of chemical cases are equally useful in



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*analyzing genus-species cases. For example, a claimed tetra-orthoester fuel composition was held to be obvious in light of a prior art tri-orthoester fuel composition based on their structural and chemical similarity and similar use as fuel additives. Dillon, 919 F.2d at 692-93, 16 USPQ2d at 1900-02. Likewise, claims to amitriptyline used as an antidepressant were held obvious in light of the structural similarity to imipramine, a known antidepressant prior art compound, where both compounds were tricyclic dibenzo compounds and differed structurally only in the replacement of the unsaturated carbon atom in the center ring of amitriptyline with a nitrogen atom in imipramine. In re Merck & Co., 800 F.2d 1091, 1096-97, 231 USPQ 375, 378-79 (Fed. Cir. 1986). See MPEP 2144.08 Obviousness of Species When Prior Art Teaches Genus.*

(Emphasis added→) This prima-facie case of obviousness between the claimed species (as recited in claim 13) and the disclosed genus (as recited in claims 1 and 6) is further supported by applicant's statement that all claims of invention of Group I and Group II should be examined together ("*both Groups were examined in the previous Office Action dated 02/23/06*" and applicant's request for withdrawal of the restriction requirement). The examiner has decided to rejoin Groups I and II because even though they are related as combination and subcombination it appears they all encompass a high degree of structural and functional similarity for patentability purposes, thereby forcing the combination (Group II) as claimed to require the particulars of the subcombination as claimed for patentability.

Therefore, the claimed species or subgenus would have also been obvious to one of ordinary skill in the pertinent art at the time the invention was made. *See MPEP 2144.08 Obviousness of Species When Prior Art Teaches Genus.*

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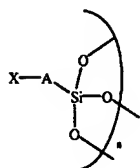
*Moreover, in this case, it is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose. The idea of combining them flows logically from their having being individually taught in the prior art. A mixture of two compositions known to individually promote, enhance or improve respective performance characteristics of a feature (i.e. the electrolyte for a fuel cell); or used in the claimed invention and being conventionally employed in the art for treating or enhancing characteristics has been held to be prima facie obvious or unpatentable. See In re Kerkhoven 626 F.2d 846, 850 205 USPQ 1069, 1072; In re Crockett 279 F.2d 274, 126 USPQ 186; Ex parte Quadranti 25 USPQ2d 1071; In re Geiger 815 F.2d 686, 2 USPQ2d 1276. (See MPEP 2144.06 Art Recognized Equivalence for the Same Purpose).*

13. Claims 1, 4-6, 9-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakano et al 2002/0061432 in view Panster et al 5380791.

Concerning claim 1, 6 and 13-16:

Nakano et al disclose a proton conductive film for an electrolytic membrane for a fuel cell, the proton conductive film being a composite body comprising a proton conductive polymer and a compound represented by the general formula (1) (ABSTRACT):

(1)



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wherein A represents a substituted or un-substituted divalent organic group (ABSTRACT); and X represents another functional group (ABSTRACT). The atomic group A represents a divalent organic group such as ethylene group, or trimethylene group or phenylene group (P. 0029).

Disclosed is the proton conductive solid polymer such as a perfluorosulfonic acid available under the tradename of NAFION (P. 0007/ EXAMPLE 1-2, 11, 12).

The fuel cell includes the electrolyte, the cathode and the anode as well (P. 0072).

With respect to claim 4-5, 9-10 and 17-18:

Disclosed is the proton conductive solid polymer such as a perfluorosulfonic acid available under the tradename of NAFION (P. 0007/ EXAMPLE 1-2, 11, 12). Nakano et al also disclose the following (P. 0026):

[0026] In the proton conductive film according to one embodiment of the present invention, it is possible for the proton conductive polymer to be provided by, for example, a polystyrene-sulfonic acid copolymer, a polyvinyl-sulfonic acid copolymer, a crosslinked alkyl sulfonic acid derivative, a fluorine-containing polymer having a fluorine-containing resin skeleton and a sulfonic group, and a fluorine-containing polymer having a fluorine-containing resin skeleton and a carboxylic group. Particularly, it is most desirable for the proton conductive polymer to be provided by a polymer having at least one of a sulfonic group and a carboxylic group and a fluorine-containing resin skeleton in view of the durability, the film strength and the ionic conductivity.

Nakano et al also disclose the use of a sulfonamide group (P. 0028).

*Note: it noted that Nafion is a perfluorosulfonic acid polymer membrane exhibiting the specific claimed fluorine amount-percent.*

Nakano et al disclose a fuel cell and polymer composite membrane as seen and described above. However, Nakano et al does not expressly disclose the silicon-based material having the specific silicon-hydrogen bond; and the specific sulfonate-disulfide groups (as recited in claims 11-16).

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Panster et al disclose sulfonated organosilicon compounds having the formula

(ABSTRACT/ COL 2, lines 28-39):

A method of producing 0.01 to 70 wt. % aqueous solutions of sulfonated organosilicon compounds having the formula



wherein  $\text{R}^1$  denotes an alkylene group with 1-12 carbon atoms (COL 2, lines 28-39).

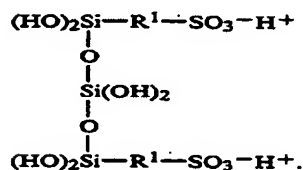
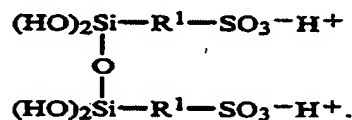
Other structural formulas disclosed by Panster et al include, inter alia, (COL 3, lines 1-15/COL 4, lines 50-68):

The invention is characterized in that a polymeric disulfane, trisulfane, or tetrasulfane compound made up of units having the formula:



in which  $\text{R}^1$  in the two cases can be the same or different and has the same meaning as in formula (I). In formula (IV),  $y$  is 2, 3 or 4, and the free valences of the oxygen

wherein  $y$  is 2 (COL 3, lines 1-15).



In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the art at the time the invention was made to use the specific the silicon-based material having the specific silicon-hydrogen bond of Panster et al in the polymer composite

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membrane and fuel cell of Nakano et al because Panster et al teach that the disclosed sulfonated organosilicon compounds can be used in catalytic environments or for surface modification of inorganic/organic materials. In addition to that, they are manufactured economically and in an ecologically efficient manner. Specifically, Panster et al's teachings about the suitability of using his sulfonated organosilicon compounds in catalytic environments make them attractive for use in electrochemical fuel cells where a catalytic reaction occurs for generating electrical power. Thus, Panster's et al teachings are pertinent to both Nakano et al and the field of applicant's endeavor.

With respect to the specific sulfonate-disulfide groups (as recited in claims 11-16), when chemical compounds have very close structural similarities and similar utilities a prima-facie case may be made. Thus, evidence of similar properties or evidence of any useful properties disclosed in the prior art that would be expected to be shared by the claimed invention weighs in favor of a conclusion that the claimed invention would have been obvious. *Dillon, 919 F.2d at 697-98, 16 USPQ2d at 1905; In re Wilder, 563 F.2d 457, 461, 195 USPQ 426, 430 (CCPA 1977); In re Linter, 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CCPA 1972)*. Indeed, when similar compounds behave similarly in certain chemical reactions, it has been held that one of ordinary skill in the relevant art would have been motivated to select either structure. In fact, similar properties may normally be presumed when compounds are very close in nature. *919 F.2d at 692, 16 USPQ2d at 1900-01. Dillon, 919 F.2d at 693, 696, 16 USPQ2d at 1901, 1904. See also In re Grabiak, 769 F.2d 729, 731, 226 USPQ 870, 871 (Fed. Cir. 1985)*. It is the properties and utilities that provide real world motivation for a person of ordinary skill to make species structurally similar to those in the prior art. *Dillon, 919 F.2d at 697, 16 USPQ2d at 1905;*

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Applicable Examples to demonstrate that additional species are prima facie obvious over a genus or similar structural/chemical compounds: Concepts used to analyze the structural similarity of chemical compounds in other types of chemical cases are equally useful in analyzing genus-species cases. For example, a claimed tetra-orthoester fuel composition was

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*held to be obvious in light of a prior art tri- orthoester fuel composition based on their structural and chemical similarity and similar use as fuel additives. Dillon, 919 F.2d at 692-93, 16 USPQ2d at 1900-02. Likewise, claims to amitriptyline used as an antidepressant were held obvious in light of the structural similarity to imipramine, a known antidepressant prior art compound, where both compounds were tricyclic dibenzo compounds and differed structurally only in the replacement of the unsaturated carbon atom in the center ring of amitriptyline with a nitrogen atom in imipramine. In re Merck & Co., 800 F.2d 1091, 1096-97, 231 USPQ 375, 378-79 (Fed. Cir. 1986). See MPEP 2144.08 Obviousness of Species When Prior Art Teaches Genus.*

(Emphasis added→) This prima-facie case of obviousness between the claimed species (as recited in claim 13) and the disclosed genus (as recited in claims 1 and 6) is further supported by applicant's statement that all claims of invention of Group I and Group II should be examined together ("*both Groups were examined in the previous Office Action dated 02/23/06*" and applicant's request for withdrawal of the restriction requirement). The examiner has decided to rejoin Groups I and II because even though they are related as combination and subcombination it appears they all encompass a high degree of structural and functional similarity for patentability purposes, thereby forcing the combination (Group II) as claimed to require the particulars of the subcombination as claimed for patentability.

Therefore, the claimed species or subgenus would have also been obvious to one of ordinary skill in the pertinent art at the time the invention was made. *See MPEP 2144.08 Obviousness of Species When Prior Art Teaches Genus.*

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*Moreover, in this case, it is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose. The idea of combining them flows logically from their having being individually taught in the prior art. A mixture of two compositions known to individually promote, enhance or improve respective performance characteristics of a feature (i.e. the electrolyte for a fuel cell); or used in the claimed invention and being conventionally employed in the art for treating or enhancing characteristics has been held to be prima facie obvious or unpatentable. See In re Kerkhoven 626 F.2d 846, 850 205 USPQ 1069, 1072; In re Crockett 279 F.2d 274, 126 USPQ 186; Ex parte Quadranti 25 USPQ2d 1071; In re Geiger 815 F.2d 686, 2 USPQ2d 1276. (See MPEP 2144.06 Art Recognized Equivalence for the Same Purpose).*

14. Claims 2-3, 7-8 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over: a) Nakano et al 2002/0061432 in view of the Japanese publication 10-069817 (heretofore 'the JP'817') and/or b) Nakano et al 2002/0061432 in view Panster et al 5380791 as applied to claims 1, 6 and 13 above, and further in view of the Deng et al's publication "Novel Nafion/Ormosil Hybrids via in-situ Sol-Gel Reactions: 2. Probe of Ormosil Phase Nanostructure by Si Solid State NMR Spectroscopy" (herein called 'Deng et al').

Nakano et al-the JP'817 and/or Nakano et al-Panster et al are applied, argued and incorporated herein for the reasons expressed above. However, none of the preceding prior art references disclose the specific weight content and grain size.



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Deng et al disclose a NAFION-organically modified silicon (ABSTRACT) wherein all membranes were converted to the SO<sub>3</sub>H form (P. 179, Left Column, 3<sup>rd</sup> full paragraph). It is further disclosed that the unfilled phase-separated morphology of the material has an average center-to-center spacing of 30-50 Å (3-5 nm) (*the grain size*) (paragraph bridging pages 177-178); and the weight content of the silicon-based material is 10.1 or 11.3 or 10.9 or 12.5 or 6.7 wt % (TABLE 1 on page 180).

In view of the above, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the silicon-based material (the invention as a whole) having the specific silicon-hydrogen bond, the specific weight content and grain size of Deng et al in the composite electrolyte of Nakano et al-the JP'817 and/or Nakano et al-Panster et al because Deng et al disclose that such silicon-based material having the specific silicon-hydrogen bond, the specific weight content and grain size, when used with a polymer material, exhibits good porosity and polarity specifically suitable for gas and liquid separation applications. Accordingly, the composite membrane interior becomes a more hydrophobic environment in which organic molecules are energetically compatible. Particularly, modified Nafion membranes have in fact been effectively tested for transport properties relating to gas and liquid separations.

#### ***Response to Arguments***

15. Applicant's arguments with respect to claims 1-19 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Raymond Alejandro  
Primary Examiner  
Art Unit 1745

  
**RAYMOND ALEJANDRO  
PRIMARY EXAMINER**